

# **ANNE A. CAMPBELL PH.D.**

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## **Office**

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Citizenship: USA                      ORCID: 0000-0001-9109-9541

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**Research Associate – Graphite Materials for Nuclear Applications, Fundamentals of Radiation Effects Group, Oak Ridge National Laboratory**

## **EDUCATION**

### **Ph.D.**

Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, Michigan. (Concentration in Radiation Effects in Materials)

Thesis Advisor: Professor Gary S. Was

Thesis Title: *The Mechanism of Proton Irradiation-Induced Creep in Ultra-Fine Grain Graphite*

Thesis Defended: November, 2013, Awarded May, 2014                      GPA 4.0/4.0

### **M.S.E.**

Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, Michigan. May 2009                      GPA 4.0/4.0

### **B.S.E.**

Nuclear Engineering, Purdue University, West Lafayette, Indiana December 2006, GPA 3.59/4.0

## **CURRENT RESEARCH FOCUS/INTERESTS**

- Fundamental understanding of radiation effects in materials for current and next-generation nuclear systems
- Changes in bulk physical and mechanical properties of nuclear graphite, resulting from neutron irradiation at various temperatures and fluences (dimensional, strength, elastic properties, thermal conductivity, thermal expansion, electrical conductivity, stored energy)
- Evolution of microstructure of graphite over multiple length scales due to neutron irradiation at various temperatures and fluences
  - Knowledge and application of currently used techniques
  - Implementation of techniques not previously used
- Use of neutron scattering at ORNL SNS and HFIR for studying irradiation-induced changes to graphite
  - One of the first researchers to perform work at SNS on activated materials
  - Proposal planning and writing
  - Collaborated on a project at the SANS at HFIR
  - Inelastic neutron scattering at SNS to study phonon density of states changes
- Microstructure effects on diffusion of fission products in graphite
- Development of advanced materials for extreme environments
- Irradiation effects on the diffusion of fission products in SiC
- Effects of stored energy recovery on the dimensional response of SiC as accident tolerant fuel cladding during accident conditions

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- Understanding and analysis of SiC radiation damage recovery as a passive temperature measurement technique, using different types of post-irradiation annealing and property measurements
- Neutron irradiation-induced creep of ferritic/martensitic steels for fission and fusion applications – experimental planning, implementation, and post-irradiation examination for mechanistic understanding
- Neutron irradiation-induced creep of accident tolerant fuel materials – experimental planning, implementation, and post-irradiation examination for mechanistic understanding

## **COMPETENCIES**

- Ability to discuss complex topics in a way that is understandable to a wide range of audiences
- Relay experimental results and scientific findings to an audience through written and oral communication
- Ability to coordinate and work with others on multi-faceted research programs, funded by both government agencies and private industry
- Designing experimental facilities to perform a series of complex measurement
- Write standard operating procedures that are suitable for training new researchers on the safe use and operation of technically complex equipment, while maintaining ORNL NQA-1 compliance
- Ability to rapidly learn about, and implement, novel experimental techniques
- Tenacity to approach a problem and continue working on it until a solution is found, and the ability to know when to ask others for guidance or assistance
- Self-motivated and able to remain on schedule when coordinating work on multiple programs with varied deadlines and meeting deadlines
- Enjoys collaborative environments and working with others to solve complex scientific problems
- Detail orientated, especially when dealing with analysis and discussion of large data sets
- Safety conscientious, with experience dealing with safety protocols when working with irradiated/activated materials

## **TECHNICAL SKILLS**

- Microscopy (Optical, SEM, limited TEM, Raman)
- Microstructure analysis (XRD, nitrogen porosimetry, micro-tomography)
- Materials property testing (Young's modulus, thermal conductivity, coefficient of thermal expansion, strength, fracture toughness, density, electrical resistivity, stored energy)
- Statistical Analysis (R, Origin, GraphPad PRISM, WeibPar)

## **PROFESSIONAL ACTIVITIES**

- Assistant Technical Chair (elected position) for Materials in Nuclear Energy Systems (MiNES) 2021 (will become technical chair for 2023 and general chair for 2025)

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- Lead organizer for “Composite Materials for Nuclear Applications” accepted symposium for TMS 2021 annual meeting
- Co-organizer – International Nuclear Graphite Specialist Meeting 2020
- Organizing committee member – Materials in Nuclear Energy Systems (MiNES) 2019
- Co-organizer “Materials and Fuels for the Current and Advanced Nuclear Reactors VII” symposium, TMS 2018 annual meeting
- Co-organizer – International Nuclear Graphite Specialist Meeting 2017

## **JOURNAL PUBLICATIONS**

- 1) I. Al-Qasir, **A.A. Campbell**, G. Sala, J.Y.Y. Lin, Y. Cheng, F.F. Islam, D.L. Abernathy, M.B. Stone, “Vacancy-Driven Variation in the Phonon Density of States of Fast Neutron Irradiated Nuclear Graphite (submitted to Carbon).
- 2) H. Wang, T. Koyanagi, J.W. Geringer, **A.A. Campbell**, Y. Katoh, “Determination of Neutron Irradiation Temperatures of SiC Using Electrical Resistivity Method”, (submitted to Journal of Nuclear Materials)
- 3) F. Islam, J.Y.Y. Lin, R. Archibald, D. Abernathy, I. Al-Qasir, **A.A. Campbell**, M. Stone, G.E. Granroth, “Super-resolution energy spectra from neutron direct-geometry spectrometers”, *Review of Scientific Instruments* V.90 (2019) P.105109-1
- 4) P.L. Mulligan, N.O. Cetiner, R. Gallagher, J.W. Geringer, **A.A. Campbell**, M. van Staden, “Finite Element Based Surrogate Modeling and Irradiation Capsule Optimization for Large-Scale Neutron Irradiation Campaigns”, *Transactions of the American Nuclear Society*, 120 (2019) 303-306.
- 5) C.I. Contescu, J.D. Arregui-Mena, **A.A. Campbell**, P.D. Edmondson, N.C. Gallego, K. Takizawa, Y. Katoh, “Development of mesopores in superfine grain graphite neutron irradiated at high fluence”, *Carbon* 141 (2019) 663.
- 6) J.D. Arregui-Mena, C.I. Contescu, **A.A. Campbell**, P.D. Edmondson, N.C. Gallego, Q.B. Smith, K. Takizawa, Y. Katoh, “Nitrogen adsorption data, FIB-SEM tomography and TEM micrographs of neutron-irradiated superfine grain graphite”, *Data in Brief*, 21 (2018) 2643.
- 7) T.J. Gerczak, J.D. Hunn, B.C. Jolly, A.T. Schumacher, X. Hu, **A.A. Campbell**, J.A. Dyer, “Development of Planar PyC/SiC Diffusion Couples to Investigate Irradiation Effects and Microstructure Variation on Fission Product Diffusion”, *Proceedings of the 2018 International Topical Meeting on High Temperature Reactor Technology (HTR2018)*, Warsaw, Poland 2018, paper #47.
- 8) J.D. Arregui-Mena, P.D. Edmondson, **A.A. Campbell**, Y. Katoh, “Site specific, high-resolution characterisation of porosity in graphite using FIB-SEM tomography”, *Journal of Nuclear Materials* 511 (2018) 164.
- 9) **A.A. Campbell**, “Historical experiment to measure irradiation-induced creep of Graphite”, *Carbon* 139 (2018) 279-288.
- 10) X. Zhou, **A.A. Campbell**, Y. Katoh, Z. Lu, J. Zhang, C.I. Contescu, and B. Liu, "Property evaluation and microstructure characterization of the A3-3 matrix graphite", *Proceedings of the 2016 International Topical Meeting on High Temperature Reactor Technology (HTR2016)*, Las Vegas, NV, 2016, 772-775.
- 11) **A.A. Campbell**, Y. Katoh, M.A. Snead, K. Takizawa, Property changes of G347A graphite due to neutron irradiation, *Carbon* 109 (2016). 860-873.

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- 12) **A.A. Campbell**, K. Takizawa, E. Cakmak, Y. Katoh, “Neutron Irradiation Effects on the Graphitic Structure of a Fine-Grain Graphite”, *Transactions of the American Nuclear Society and Embedded Topical Meeting Nuclear Fuels and Structural Materials for the Next Generation Nuclear Reactors (NFSM)*, Vol. 114, June 12-16, 2016, New Orleans, LA, p 1119-1120.
- 13) **A.A. Campbell**, W.D. Porter, Y. Katoh, L.L. Snead, “Method for Analyzing Passive Silicon Carbide Thermometry with a Continuous Dilatometer to Determine Irradiation Temperature”, *Nuclear Instruments and Methods in Physics Research B*, 370 (2016), 49-58.
- 14) Numerous authors, “LAMDA: A facility for advanced characterization of irradiated materials at Oak Ridge National Laboratory”, *Transactions of the American Nuclear Society*, Vol. 113, Washington, D.C., November 8–12, 2015, p581-582.
- 15) **A.A. Campbell**, and G.S. Was, “Proton Irradiation-Induced Creep of Ultra-Fine Grain Graphite”, *Carbon*, 77 (2014), 993-1010.
- 16) **A.A. Campbell**, K.B. Campbell, and G.S. Was, “Anisotropy Analysis of Ultra-Fine Grain Graphite and Pyrolytic Carbon”, *Carbon*, 60 (2013) 410.
- 17) **A.A. Campbell** and G.S. Was, “In-Situ Proton Irradiation-Induced Creep at Very High Temperature”, *Journal of Nuclear Materials*, 433, (2013), 86-94.
- 18) **A.A. Campbell**, K.B. Campbell, and G.S. Was, “A Methodology for Quantitative Determination of Anisotropy of Pyrolytic Carbon”, *Transactions of the American Nuclear Society and Embedded Topical Meeting Nuclear Fuels and Structural Materials for the Next Generation Nuclear Reactors (NFSM)*, Vol. 102, June 13-17, 2010, San Diego, CA, p 843-844.

## **BOOK CHAPTERS**

1. **A.A. Campbell**, T.D. Burchell, “Radiation Effects in Graphite”, *Comprehensive Nuclear Materials*, 2<sup>nd</sup> edition, in-publication.
2. F. Onimus, T. Jourdan, C. Xu, J. Garnier, **A.A. Campbell**, M. Griffiths, “Irradiation creep in materials”, *Comprehensive Nuclear Materials*, 2<sup>nd</sup> edition, in-publication.

## **INVITED TALKS/SEMINARS**

1. **A.A. Campbell**, “Challenges with ASME “Code Qualifying” Graphite Irradiation Effects in Test Reactors”, Invited presentation at the U.S. NRC Advanced Non-Light Water Reactors – Materials and Component Integrity Workshop, Rockville, MD December 2019.
2. **A.A. Campbell**, “Understanding Graphite Behavior in Nuclear Reactor Environments for Lifetime Predictions”, Invited presentation at the U.S. NRC Advanced Non-Light Water Reactors – Materials and Component Integrity Workshop, Rockville, MD December 2019.
3. **A.A. Campbell**, “Nuclear Graphite for Advanced Reactors”, Invited lecture at the 2019 Modeling, Experimental, and Validation (MeV) School, Oak Ridge, TN, July 2019.
4. **A.A. Campbell**, J.D. Arregui-Mena, Y. Katoh, C.I. Contescu, “Mechanical and Thermal Behavior of Graphite in Nuclear Reactor Applications”, invited presentation at TMS 2019 Annual Meeting & Exhibition, San Antonio, TX, March 2019

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5. **A.A. Campbell**, “Understanding Changes to Graphite Properties in Nuclear Reactor Environments”, Invited presentation at 2017 MRS Fall Meeting and Exhibit, Boston, MA, November 2017.

## **IN-PROCESS PUBLICATIONS**

- 1) H. Wang, T. Koyanagi, J.W. Geringer, **A.A. Campbell**, Y. Katoh, “Determination of Neutron Irradiation Temperatures of SiC Using Electrical Resistivity Method”.
- 2) **A.A. Campbell**, Y. Katoh, M.A. Snead, T.D. Burchell, and W.D. Porter, “Effect of Specimen Size on the Properties of Fine-Grain Isotropic Nuclear Graphite (Part 1 of 2 Physical Properties)”, submitted to *Carbon*.
- 3) **A.A. Campbell**, A.A. Wereszczak, Y. Katoh, M.A. Snead, and T.D. Burchell, “Effect of Specimen Size on the Properties of Fine-Grain Isotropic Nuclear Graphite (Part 2 of 2 Strength)”, submitted to *Carbon*.
- 4) **A.A. Campbell**, et al., “LAMDA: An Integrated Resource for the Microstructural, Thermal, and Mechanical Testing of Materials with Low Activity – Part II: Material Property Capabilities”, to be submitted to *Journal of Nuclear Materials*
- 5) P.D. Edmondson (**third author**), “LAMDA: An Integrated Resource for the Microstructural, Thermal, and Mechanical Testing of Materials with Low Activity – Part I: Microscopy Capabilities”, to be submitted to *Journal of Nuclear Materials*

## **ORNL REPORTS**

- 1) **A.A. Campbell**, C.I. Contescu, E. Cakmak, N.C. Gallego, T.D. Burchell, “Effects of High-Temperature Irradiation on the Microstructure of Nuclear Graphite”, ORNL/TM-2019/1309.
- 2) J.W. Geringer, **A.A. Campbell**, J. Robertson, “Analysis of SiC Temperature Monitors from AECL Capsule Series (Campaign 6)”, ORNL/TM-2019/1261.
- 3) T.J. Gerczak, J.D. Hunn, R. Seibert, **A.A. Campbell**, “FY19Q3 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/SPR-2019, 1241.
- 4) **A.A. Campbell**, J.W. Geringer, P. Mulligan “Progress Report of the Oak Ridge National Laboratory NBG-18 Qualification Level Irradiation Program: Period Ending June 2019”, ORNL/TM-2019/1212.
- 5) T.J. Gerczak, **A.A. Campbell**, X. Hu, J.D. Hunn, R. Seibert, “FY19Q2 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/SPR-2019/1167.
- 6) T.J. Gerczak, **A.A. Campbell**, X. Hu, J.D. Hunn, R. Seibert, A. Schumacher, B. Jolly, “FY19Q1 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/SPR-2019/1073.
- 7) **A.A. Campbell**, J.W. Geringer, “SGL Carbon NBG-18 Billet Selection for Size Effect Study and Irradiation Program”, ORNL/LTR-2018/1038.
- 8) T.J. Gerczak, **A.A. Campbell**, X. Hu, J.D. Hunn, R. Seibert, “FY18Q4 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/SPR-2018/1046.

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- 9) **A.A. Campbell**, Y. Katoh, “Summary Report on Effects of Irradiation on Material IG-110 – Prepared for Toyo Tanso Co., Ltd.”, ORNL/TM-2018/1040.
- 10) **A.A. Campbell**, J.W. Geringer, “SGL Carbon NBG-18 Size Effect Study for X-energy – Revision 4”, ORNL/TM-2018/1024.
- 11) T.J. Gerczak, **A.A. Campbell**, X. Hu, J.D. Hunn, B. Jolly, R. Seibert, A. Schumacher, “12) Preparation of Diffusion Couples for Irradiation and High Temperature Testing of Representative TRISO PyC/SiC”, ORNL/TM-2018/1012.
- 13) **A.A. Campbell**, J.W. Geringer, B. Eckhart, K. Leonard, “Analysis of Silicon Carbide Temperature Monitors from AECL-11 and AECL-12 Capsules”, ORNL/TM-2018/960.
- 14) T.J. Gerczak, **A.A. Campbell**, X. Hu, J.D. Hunn, B. Jolly, A. Schumacher, R. Seibert, “FY18Q3 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/TM-2018/918.
- 15) J.W. Geringer, **A.A. Campbell**, P. Mulligan, N. Cetiner, T.D. Burchell, “Progress planning for irradiation, designing irradiation capsule, and measuring pre-irradiation properties of specimens made from NBG-18 graphite”, ORNL/LTR-2018/512
- 16) **A.A. Campbell**, Y. Katoh, “Cumulative Results of Irradiation Induced Creep of Material IG-110 - Prepared for Toyo Tanso Co., Ltd.”, ORNL/LTR-2018/511.
- 17) T.J. Gerczak, **A.A. Campbell**, J.D. Hunn, B. Jolly, A. Schumacher, “FY18Q2 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/TM-2018/835.
- 18) T.J. Gerczak, **A.A. Campbell**, J.D. Hunn, A. Schumacher, B. Jolly, “FY18Q1 Quarterly Report: Radiation Enhanced Diffusion of Ag, Ag-Pd, Eu, and Sr in Neutron Irradiated PyC/SiC Diffusion Couples”, ORNL/TM-2018/766.
- 19) **A.A. Campbell**, A.P. Selby, Y. Katoh, “Report on Effects of Irradiation on Material ETU-10 - Prepared for Ibiden Co., Ltd”, ORNL/TM-2017/737.
- 20) **A.A. Campbell**, Y. Katoh, “Report on Effects of Irradiation on Material IG-110 - Prepared for Toyo Tanso Co., Ltd.”, ORNL/TM-2017/705.
- 21) T.J. Gerczak, **A.A. Campbell**, J.D. Hunn, B. Jolly, A. Schumacher, “Progress on Fabrication of Planar Diffusion Couples with Representative TRISO PyC/SiC Microstructure”, ORNL/TM-2017/704.
- 22) **A.A. Campbell**, J. McDuffee, R. Howard, “Discussion of Two-Temperature Zones for Sinosteel Creep Experiments”, ORNL/LTR-2017/357
- 23) **A.A. Campbell**, M. Snead, Y. Katoh, “Graphite Pre-Irradiation Specimen Size Validation and Testing Program NSCC-NCK Group Results”, ORNL/TM-2017/326
- 24) R. Stoller, R. Howard, **A.A. Campbell**, K. Leonard, “Oak Ridge National Laboratory Analysis of Silicon Carbide Temperature Monitors from AECL Irradiations in HFIR”, ORNL/TM-2017/189
- 25) **A.A. Campbell**, M. Snead, Y. Katoh, “Graphite Pre-Irradiation Specimen Size Validation (PSSV) Test Guide – Sinosteel Advanced Materials (Zhejiang) Co., Ltd.”, ORNL/TM-2016/719.
- 26) **A.A. Campbell**, M. Snead, “Graphite Pre-Irradiation Test Specification -Sinosteel Advanced Materials (Zhejiang) Co., Ltd.”, ORNL/TM-2016/264
- 27) **A.A. Campbell**, Y. Katoh, and M.A. Snead, “Final Report on Effects of Irradiation on Material G347A - Prepared for Tokai Carbon Co., Ltd.”, ORNL/TM-2015/665.

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- 28) T.M. Rosseel, **A.A. Campbell**, D.E. Erdman, M. N. Gushev, Y. Le Pape, and C. M. Silva, “Report on the Post-irradiation Examination of Irradiated Mineral Analogues of Concrete Aggregate Specimens”, ORNL/LTR-2015/453
- 29) **A.A. Campbell**, Y. Katoh, M. Snead, “Determination of Specimen Temperature from Post-Irradiation Analysis of SiC Temperature Monitors” ORNL/LTR-2015/183.
- 30) **A.A. Campbell**, “Validation of the IMCE RFDA System for Dynamic Elastic Moduli Measurements”, ORNL/TM-2015/15.

## **EQUIPMENT OPERATING GUIDELINES**

- 1) **A.A. Campbell**, “Measuring Dynamic Young’s Modulus and Shear Modulus via Sonic Velocity, ORNL Standard Operating Guideline.
- 2) **A.A. Campbell** and B.D. Eckhart, “Measuring Dynamic Young’s Modulus and Shear Modulus via Impulse Excitation, ORNL Standard Operating Guideline.

## **PREVIOUS RESEARCH EXPERIENCE**

### **Post-Doctoral Research**

- Changes in physical and mechanical properties of nuclear graphite, resulting from neutron irradiation at various temperatures and fluences
  - Measurement of physical, thermal, and mechanical properties, and microstructural changes that occur in neutron-irradiated graphite
- Systematic analysis of passive SiC thermometry to determine irradiation temperature of non-instrumented neutron irradiation capsules.
- Microstructure analysis of graphite to understand the microstructure on multiple scales.
  - Knowledge and application of currently used techniques
  - Implementation of techniques not previously used
- Neutron irradiation effects on MAX phase materials.

Mentor: Yutai Katoh

### **Ph.D. Research**

- Proton irradiation effects in graphite, including changes in dimensions, mechanical properties, crystal structure, and anisotropy during unrestrained irradiation, and changes in dimensions, mechanical properties, crystal structure, and anisotropy during stressed irradiation.
- Design and validation of a high temperature proton irradiation stage for performing proton irradiation-induced creep experiments on for graphite and other materials.
- Irradiation effects in pyrolytic carbon for TRISO fuel

Advisor: Prof. Gary S. Was

### **Oak Ridge National Laboratory – HERE Summer Internship**

- Develop a method for producing pyrolytic carbon strip samples that can be used for irradiation-induced creep experiments.

Nuclear Materials Science and Technology Group

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## **B.S. Research**

- Modeling of Atucha II reactor fuel assemblies in MCNP5 and DRAGON
  - School of Nuclear Engineering, Purdue University, Supervisor: Prof. T. Downar
- Slow neutron modeling research in MCNP5 for use in boron neutron capture therapy
  - School of Nuclear Engineering, Purdue University, Supervisor: Prof. T. Jevremovic

## **EMPLOYMENT**

- UT-Battelle** – Oak Ridge, Tennessee 06/2016 – Present  
Research Associate at Oak Ridge National Laboratory in Fundamentals of Radiation Effects Group
- Oak Ridge Associated Universities** – Oak Ridge, Tennessee 03/2014 – 06/2016  
Post-Doctoral Research Associate at Oak Ridge National Laboratory in Fusion Materials and Nuclear Structures group.  
Mentor: Yutai Katoh
- University of Michigan** – Ann Arbor, Michigan 01/2007 – 02/2014  
Nuclear Engineering and Radiological Sciences Graduate Student  
Ph.D. advisor: Gary S. Was
- Oak Ridge National Laboratory** – Oak Ridge, Tennessee 06/2010 – 08/2010  
Higher Education Research Experiences (HERE) Summer Internship
- Purdue University** – West Lafayette, Indiana
- Undergraduate Research Assistant (Prof. Thomas Downar) 01/2006 – 08/2006
- Assisted graduate students in writing input files for reactor analysis
- Undergraduate Laboratory Assistant (Prof. Sean McDevitt) 01/2004 – 05/2004
- Worked with other students in setup of a new research laboratory
- North Carolina State University** – Raleigh, North Carolina 06/2005 – 08/2005  
Undergraduate Assistant at PULSTAR Nuclear Reactor (Prof. Ayman Hawari)
- Assisted with setup of the Neutron Imaging Facility
  - Designed experiment for neutron absorption standard for Neutron Imaging Facility
  - Assisted with setup of the Neutron Powder Diffractometer
  - Design and build of a pressurized air supply for experiments in the reactor room
  - Performed a flux map of one of the PULSTAR beam tube

## **TEACHING EXPERIENCE**

### **University of Michigan**

- Graduate Student Instructor (NERS 421 – Nuclear Engineering Materials) Fall 2012  
Professor Michael Atzmon
- Graduate Student Instructor (NERS 484 – Radiation Health Effects) Fall 2011  
Professor Kimberlee Kearfott
- Graduate Course Assistant (NERS 522 – Nuclear Fuels) Winter 2010  
Professor Gary Was

### **Purdue University**

- Grader for Undergraduate and Graduate Radiation Laboratory Classes Fall 2006, Winter 2005  
Instructor: Jere Jenkins

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## **HONORS AND ACTIVITIES**

### **Awards and Scholarships**

Outstanding Student Oral Presentation, Microstructural Processes in Irradiated Materials Symposia, 2011 TMS annual meeting	2011
Rackham Predoctoral Fellowship Nominee	2011
American Nuclear Society John Randal Memorial Scholarship Recipient	2010
Susan Lipschutz Award Nominee	2010
Marian Sarah Parker Prize Nominee	2010
Rackham Travel Fellowship	2008, 2010, 2011, 2012
Dean's List	2005, 2006
Academic Achievement Award	2002
Fraternal Order of Vikings Scholarship	2002

### **Societies and Organizations**

ORNL – Early Career Professionals Board Member	2014 – present
The Minerals, Metals, and Materials Society	2007 – present
The American Ceramic Society	2007 – present
Materials Research Society	2008 – present
American Nuclear Society National member	2003 – present
Materials Science and Technology Executive Committee member	2016 – 2019
Michigan section member	2007 – 2014
Purdue University Chapter President	05/2005 – 05/2006
Purdue University Chapter Vice President	01/2005 – 05/2005
Young Professionals of Oak Ridge	2014 – 2015
Alpha Nu Sigma National Honors Society (ANSHS)	2005 – 2014
University of Michigan Chapter President	04/2008 – 04/2010
Tau Beta Pi	2006 – 2014
Michigan Gamma Graduate Coordinator	01/2009 – 12/2009
Distinguished active, winter 2009 & fall 2009	
The Epeians – Engineering Leadership Honor Society	2009 – 2014
Tau Beta Sigma	2003 – 2006
Purdue University Chapter Treasurer	01/2004 – 12/2004
Tau Beta Pi – Greater Smoky Mountains Alumni Chapter	2014 – present
President	06/2017-05/2018

### **Volunteer Activities**

Tennessee Achieves Mentor	2016
Roane State Tutoring	2014 – 2015
Judge for the Southeast Michigan Science Fair	2009, 2010